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## THE CHEMISTRY OF COOKERY.

By W. Mattieu Williams.

XXIII.

IN my last I referred generally to the high nutritive value of cheese. I will now state particulars. First, as regards the water. Taking muscular fibre without bone, *i.e.*, selected best part of the meat, beef contains on an average 72½ per cent. of water; mutton, 73½; veal, 74½; pork, 69¾; fowl, 73¾; while Cheshire cheese contains only 30⅓, and other cheeses about the same. Thus, at starting, we have in every pound of cheese rather more than twice as much solid food as in a pound of the best meat, or comparing with the average of the whole carcase, including bone, tendons, &c., the cheese has an advantage of three to one.

The following results of Mulder's analysis of casein, when compared with those by the same chemist of albumen, gelatine, and fibrin, show that there is but little difference in the ultimate chemical composition of these, so far as the constituents there named are concerned.

| | | |
|---|---|---|
| Carbon | 53·83 | Casein. |
| Hydrogen | 7·15 | |
| Nitrogen | 15·65 | |
| Oxygen, Sulphur | 23·37 | |

| | Albumen. | Gelatine. | Fibrin. |
|---|---|---|---|
| Carbon | 53·5 | 50·40 | 52·7 |
| Hydrogen | 7·0 | 6·64 | 6·9 |
| Nitrogen | 15·5 | 18·34 | 15·4 |
| Oxygen | 22·0 | 24·62 | 23·5 |
| Sulphur | 1·6 | ,, | 1·2 |
| Phosphorus | 0·4 | ,, | 0·3 |

We may therefore conclude that, regarding these from the point of view of nitrogenous or flesh-forming, and carbonaceous or heat-giving constituents, these chief materials of flesh and of cheese are about equal.

The same is the case as regards the fat. The quantity in the carcase of oxen, calves, sheep, lambs, and pigs varies, according to Dr. Edward Smith, from 16 per cent. to 31·3 per cent. in moderately-fatted animals, while in whole milk cheeses it varies from 21·68 per cent. to 32·31 per cent., coming down in skim-milk cheeses as low as 6·3. Dr. Smith includes Neufchatel cheese, containing 18·74 per cent., among the whole-milk cheeses. He does not seem to be aware that the cheese made up between straws and sold under that name is a *ricotta*, or crude curd of skim-milk cheese. Its just value is about threepence per pound. In Italy, where it forms the basis of some delicious dishes (such as *budino di ricotta*, of which anon), it is sold for about twopence per pound or less.

There is a discrepancy in the published analyses of casein which demands explanation here, as it is of great practical importance. They generally correspond to the above of Mulder within small fractions, as shown below in those of Scherer and Dumas:—

| | Scherer. | Dumas. |
|---|---|---|
| Carbon | 54·665 | 53·7 |
| Hydrogen | 7·465 | 7·2 |
| Nitrogen | 15·724 | 16·6 |
| Oxygen, sulphur | 22·146 | 22·5 |

In these the 100 parts are made up without any phosphate of lime, while, according to Lehmann ("Physiological Chemistry," vol. i., p. 379, Cavendish Edition), "casein that has not been treated with acids contains about 6 per cent. of phosphate of lime; more, consequently, than is contained in any of the protein compounds we have hitherto considered."

From this it appears that we may have casein with, and casein without, this necessary constituent of food. In precipitating casein for laboratory analysis, acids are commonly used, and thus the phosphate of lime is dissolved out; but I am unable at present to tell my readers the precise extent to which this actually occurs in practical cheese-making where rennet is used. What I have at present learned only indicates generally that this constituent of cheese is very variable; and I hereby suggest to those chemists who are professionally concerned in the analysis of food, that they may supply a valuable contribution to our knowledge of this subject by simply determining the phosphate of lime contained in the ash of different kinds of cheese. I would do this myself, but, having during some ten years past forsaken the laboratory for the writing-table, I have neither the tools nor the leisure for such work; and, worse still, I have not that prime essential to practical research (especially of endowed research), a staff of obedient assistants to do the drudgery.

The comparison specially demanded is between cheeses made with rennet and those Dutch and factory cheeses the curd of which has been precipitated by hydrochloric acid. Theoretical considerations point to the conclusion that in the latter much or even all of the phosphate of lime may be left in solution in the whey, and thus the food-value of the cheese seriously lowered. We must, however, suspend judgment in the meantime.

In comparing the nutritive value of cheese with that of flesh, the retention of this phosphate of lime nearly corresponds with the retention of the juices of the meat, among which are the phosphates of the flesh.

These phosphates of lime are the bone-making material of food, and have something to do in building up the brain and nervous matter, though not to the extent that is supposed by those who imagine that there is a special connection between phosphorus and the brain, or phosphorescence and spirituality. Bone contains about eleven per cent. of phosphorus, brain less than one per cent.

The value of food in reference to its phosphate of lime is not merely a matter of percentage, as this salt may exist in a state of solution, as in milk, or as a solid very difficult of assimilation, as in bones. That retained in cheese is probably in an intermediate condition—not actually in solution, but so finely divided as to be readily dissolved by the acid of the gastric juice.

I may mention, in reference to this, that when a child or other young animal takes its natural food in the form of milk, the milk is converted into unpressed cheese, or curd, prior to its digestion.

Supposing that on an average cheese contains only one-half of the 6 per cent. of phosphate of lime found, as above, in the casein, and taking into consideration the water contained in flesh, the bone, &c., we may conclude generally that one pound of average cheese contains as much nutriment as three pounds of the average material of the carcass of an ox or sheep as prepared for sale by the butcher; or, otherwise stated, a cheese of 20 lb. weight contains as much food as a sheep weighing 60 lb. as it hangs in the butcher's shop.

Now comes the practical question. Can we assimilate or convert into our own substance the cheese-food as easily as we may the flesh-food?

I reply that we certainly cannot if the cheese is eaten raw; but have no doubt that we may if it be suitably cooked. Hence the paramount importance of this part of my subject. A Swiss or Scandinavian mountaineer can and does digest and assimilate raw cheese as a staple article of food, and proves its nutritive value by the result; but feebler bipeds of the plains and towns cannot do the like.

I may here mention that I have recently made some experiments on the dissolving of cheese by adding sufficient alkali (carbonate of potash) to neutralise the acid it contains, thus converting the casein into its original soluble form as it existed in the milk, and have partially succeeded both with water and milk as solvents; but before reporting these results in detail I will describe some of the practically-established methods of cooking cheese that are so curiously unknown or little known in this country.

In the fatherland of my grandfather, Louis Gabriel Mattieu, one of the commonest dishes of the peasant who tills his own freehold and grows his own food is a "fondevin" (I cannot explain the etymology of the word, and spell it only by ear, never having seen it in print or writing). This is a mixture of cheese and eggs, the cheese grated and beaten into the egg as in making omelettes, with a small addition of new milk or butter. It is placed in a little pan like a flower-pot saucer, cooked gently, served as it comes off the fire, and eaten from the vessel in which it is cooked. I have made many a hearty dinner on one of these, *plus* a lump of black bread and a small bottle of genuine, but thin, wine; the cost of the whole banquet at a little *auberge* being usually less than sixpence. The cheese is in a pasty condition, and partly dissolved in the milk or butter. I have tested the sustaining power of such a meal by doing some very stiff mountain climbing and long fasting after it. It is rather too good —over nutritious—for a man only doing sedentary work.

A diluted and delicate modification of this may be made by taking slices of bread, or bread and butter, soaking them in a batter made of eggs and milk—without flour—then placing the slices of soaked bread in a pie-dish, covering each with a thick coating of grated cheese, and thus building up a stratified deposit to fill the dish. The surplus batter may be poured over the top; or if time is allowed for saturation, the trouble of preliminary soaking may be saved by simply pouring all the batter thus. This, when gently baked, supplies a delicious and highly nutritious dish. We call it cheese pudding at home, but my own experience convinces me that we make a mistake in using it to supplement the joint. It is far too nutritious for this; its savoury character tempts one to eat it so freely that it would be far wiser to use it as the Swiss peasant uses his fondevin, *i.e.* as the one and only dish of a good wholesome dinner.

I have tested its digestibility by eating it heartily for supper. No nightmare has followed. If I sup on a corresponding quantity of raw cheese my sleep is miserably eventful.

## THE SENSES IN INFANTS.

I.

IT is related of a deaf and dumb mother that one night, some few days after the birth of her first child, she was seen by the nurse who tended her to rise from her couch, glide stealthily up to the hearth, take from it a ponderous lump of coal, and, with it poised aloft in her hands, to approach the cradle of her sleeping infant. Then, before the horror-stricken nurse could in any way interfere, she dashed the heavy fragment with all conceivable violence to the ground. Naturally the child woke startled out of its slumbers, opened its eyes, agitated its limbs, and began screaming lustily. Whereupon the mother manifested the most unmistakable signs of joy, thus revealing to the astonished nurse that this strange conduct had not been dictated by any homicidal tendency, but had simply sprung from the deliberate and maternal desire to ascertain if her child participated in its mother's misfortune.

Now, we only repeat this story in order to make one little comment on it.

Had it been possible for the mother to try her ingenious experiment at an earlier period of her child's life—say some three hours after birth—she would have suffered a grievous disappointment. The child would not have been aroused by the sound of the falling coal for the simple reason that it would not have heard it. The fact is, children are born perfectly deaf, and remain so for a space varying from six hours to two and even three days. That this should be so cannot be wondered at, when we remember that the human being comes into the world with an immatured nervous system, so that for some time after birth, certain of the sense organs are not ready to enter upon their normal activities. It follows as a necessary corollary from this, that the consciousness of the infant of a few days is something very different from that of a child of three or four years old. The infant's organic sensibility—all those sensations connected with the body's performance of its organic functions—is, with certain exceptions, pretty much in the beginning what it will be all through life. The sensation of hunger, for instance, is felt shortly after birth; and undoubtedly the pains of deranged digestion, resulting in infantile colics, are at a very early period a strongly marked and highly unpleasant experience for the infant. Again, susceptibility to temperature is a well manifested phenomenon. The intensity of the painful sensation of cold is attested by the cries, both of infants and other young animals whose temperature has been allowed to fall, while the pleasurable sensation induced by warmth is proved, at first negatively by the cessation of cries and all other signs of discomfort, and later on by the presence of those signs characteristic of general well-being. The sensation of warmth, indeed, is so grateful to the child, that it always argues either some constitutional peculiarity on its part, or some bad management on the part of those who have the care of it, if it fails to find pleasure from its immersion in warm water.

But this by the way.

So far as the foregoing and other of the organic sensations are concerned, the infant of a week old is very nearly

on a par with the child of a couple of years. The case is the same with regard to that one of the five senses which is most closely allied to organic sensibility. We allude to *Taste.*

Taste is a remarkably well-developed sense. The new-born infant is able from the very first to discriminate all strong impressions of taste, and, according to experiments conducted many years ago by Dr. Kussmaul, the expression of face for a bitter taste differs from the grimace elicited by a sour one, and both these, of course, from the pleasurable look which accompanies sweet tastes. Even in the absence of actual experiment the developed state of the sense of taste cannot fail to strike those who have had much to do with babies. The son of the philosopher Tiedemann, for instance, was observed by his father to distinguish the taste of medicine from that of his ordinary food when only thirteen days old. Professor Luigi Ferri, in an interesting article contributed to a scientific review ("La Filosofia delle Scuole Italiane") states that at a very early stage of his little girl's existence she obstinately refused goats' and asses' milk, while there are innumerable instances where infants of two and three months old have pushed away their feeding bottles when the contents were not sweetened to their liking.

In face of all these facts, we cannot but agree with Professor Preyer, that taste is the first sense, and judgment and memory have their earliest development in the region of this sense. It is partly on account of this that the purely instinctive action of taking nourishment so soon becomes amenable to the control of the will, till children not only sustain the necessary action when begun, but learn to make spontaneous movements to begin it.

After taste, the two senses which come earliest into play are smell and touch. Now, with regard to smell, it is more by logical deduction than by direct testimony that we can attest its presence. To the human being, smell is the least important of all the five senses, and therefore what olfactory sensations there are at the beginning of life would probably be of the faintest. We know, however, that the sense of smell cannot be in total abeyance, because it is intimately connected with taste, so that the presence of the one implies the presence of the other. Not to smell is not to taste—a truth recognised in the homely advice to "hold your nose" when you have to swallow nauseous medicine

There being no satisfactory means of discovering the relative intensity of the olfactory sensations of the new-born infant, some scientific inquirers have had recourse to experiments on newly-born animals. But such experiments are necessarily inconclusive as regards human beings, just because the place of smell in the hierarchy of sense is not identical in the case of men and animals. With animals, smell is the most important of the senses, since it is by its means that they track their prey and avoid danger. We are therefore prepared to find in them an early and wonderful power of discriminating smells, and the following experiment tried many hundred years ago by Galen makes no undue claims on our credulity.

Galen brought a newly-dropped kid into a room in which were placed several open vessels containing wine, honey, oil, grain, and milk.

Soon, the little animal struggled to its legs, and after staggering from one vessel to another, sniffing at each in turn, finally came back to the one which held milk and drank out of that. Obviously only the sense of smell could have dictated this choice, and a very finely developed sense too it must have been. In men, such an early development of this sense is not to be expected. As we said before, smell serves the very humblest functions in our lives, save, indeed, when there is any unusual want of acuteness in the other sense. Under these circumstances, truly smell rises into prominence and conveys to the mind much knowledge of outside things, which ordinarily would be transmitted by other channels.

As an example of this we may instance James Mitchell, the blind, deaf-mute, whose sense of smell was rendered so abnormally active by the defectiveness of his other senses that he could perceive the presence of a stranger simply by this one sense.

Rare and exceptional cases such as these, however, do not affect the general truth, that smell with us is a subsidiary sense, and therefore but feebly manifested in the infant's early life. When smell, however, does begin to show itself, it may be safely said that it will always be in the direction of what we may call alimentary odours. A child who, at the age of nine or ten months, shows a marked preference for chocolate, coffee, and all other articles of food which furnish sensations both of taste and smell, will be found on subsequent investigation to be very susceptible to smells generally. A. M. H. B.

*(To be continued.)*

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THE FIRST INVENTOR OF THE TELEPHONE.—An important decision has been made by the American Patent Office examiner on the title to the first invention of the speaking telephone. The chief claimants for the honour were Bell, Edison, Gray, and Dolbear, but many other inventors set up claims to a share in the invention. The whole invention or subject-matter in dispute was divided under a number of heads. The first of these relates to the art of transmitting sonorous vibrations of all kinds and quality by varying the strength of an electric current, and Bell is declared the first to have invented this. In the second article, which relates to the means of transmitting speech by varying resistance in the transmitter, Gray was declared the first to conceive and disclose the invention in his caveat of February 14, 1876, but failed to take action and complete it until others had done so, hence the priority is awarded to Bell. Edison is declared the first to employ an "electro-hydro-telephone, the fluid holding vertically an adjustable tube, within which the ends of the platinum points are immersed," he having exhibited this feature in a water telephone at the end of December, 1876. Bell is awarded priority for the magneto-induction, transmitting, and receiving telephone; the date of his patent being February 14, 1876. An important decision relates to "a telephonic receiver consisting of the combination in an electric circuit of a magnet and a diaphragm supported and arranged in close proximity thereto, whereby sounds thrown upon the line may be reproduced accurately as to pitch and quality. May, 1875, is the date of McDonough's invention of this device, and priority is awarded to him. The well-known Bell receiver is therefore a mere variation of McDonough's earlier invention; but the "combination with an electro-magnet of an iron or steel diaphragm secured to a resonant case" is declared to be Bell's. Edison is awarded priority in the case of a spring carrying one electrode and pressing it against the other electrode and diaphragm. While upon this subject, we may refer to Professor Silvanus P. Thompson's recent researches into the earlier works of Philip Reis, recently published in the form of a biography. Prof. Thompson shows that Reis is the original inventor of the speaking telephone, that he intended it to speak, and that it did speak more or less perfectly.—*Engineering.*

XUM

## PLEASANT HOURS WITH THE MICROSCOPE.

By Henry J. Slack, F.G.S., F.R.M.S.

MOST of the older naturalists regarded species as originating in distinct creative acts, and the natural theologians following, or helping to mislead them, studied every creature and every part of each creature upon the supposition of special design and adaptation to the performance of particular functions. According to such theories the whole order of nature appeared as an exhibition of an infinite number of detached parts, and every organ of any living thing as a contrivance like a tool made by a skilful artisan. A stricter and wider examination of plants and animals showed points of connection and lines of transition. Descent does not invariably produce an exact repetition of the parent forms, but sometimes modifications occur, which, if useful to the creature, and also capable of hereditary transmission, give rise to varieties and species, the latter being, in fact, only the former in a lasting condition. Under the older conception, it was impossible to explain the existence of obsolete parts no longer useful, or of parts that did not work in the best possible way. The newer and truer philosophy discovers a unity of plan throughout Nature, and traces organs from rudimentary beginnings to their completest development. Eyes, for example, do not always see, as we understand seeing. The simplest eye forms no image, but allows its possessor to have some sensation of light; and organs of all kinds, which some creatures possess in an elaborate condition of structure, may be found in simpler stages of development in others. Another important fact brought into view by recent investigations is that parts which are morphologically the same may have widely different functions to perform. It is well to bear these things in mind when examining any of the interesting insects of the group to which bees, wasps, ants, &c., belong, and a caution may again be given to the effect that the more scientific view of Nature does not militate against Natural Theology, but, on the contrary, raises its character and strengthens its evidence.

The two orders Nemoptera and Hymenoptera are both composed of four-winged insects, but while the former—which are the best flyers—have equal wings, the latter have the hind wings much smaller than the front ones. The veins are also fewer, and do not produce the network appearance characteristic of the Nemoptera. The Hymenoptera have horny jaws, and tongues adapted to lapping, or both lapping and sucking, as in bees, and their maxillæ close upon the tongues and form a sheath assisting their action, as was explained in former papers. The females of different kinds of Hymenoptera are furnished with stings, saws, and ovipositors, very various in size and shape, but in all cases essentially the same organs modified to different uses. The wasps and bees deposit their eggs in cells which they build or dig out. Their stings assist in directing the eggs to the right place, but their chief function is warlike. They are weapons rather than ovipositors. The gall-flys' instruments are borers as well as ovipositors. They pierce little holes in trees, and, like the bees and wasps, eject an irritating fluid which stimulates the plant to develop the peculiar growth such as the nutgall, leaf galls, and spangles of the oak, or the hairy bedeguar of the rose, which serve at once as houses and larders for their grubs. The saw-flies have their terminal organs modified into saws, as their name suggests, with which they cut slits in bark or leaf, and drop their eggs into them. The ichneumons work with slender tools, longer or shorter according to their habits. They commonly insert their eggs into the bodies of caterpillars, and their grubs feed upon their host so prudently that they do not kill it until they are ready to emerge. A general description of the ovipositors, stings, &c., is given as follows, by Mr. Westwood. He remarks that "from the centre of the underside of the abdomen, near its extremity, arise two plates, each consisting of two joints, sometimes valvular, and together forming a scabbard, sometimes more slender, and resembling palpi, and sometimes very long; between these plates as they exist in the bee, under the form of two flattened plates with a pair of terminal lobes, arise two other pieces, which are very slender, serrated on the tip in the bees, but much broader in the sawflies, and transversely striated, forming the saws with which these insects are provided." There are five or six parts in these tools, though some are so often reduced in size as scarcely to be noticeable. In bees and wasps the sheath is a strong piercing implement, and it holds in a groove two fine stings which are worked by a mechanism that squeezes the poison-bag at the time they penetrate the victim of the attack. The serrated tips prevent their withdrawal out of any firm substance, and consequently when the insect strikes an enemy, it often inflicts a fatal injury upon itself. The sting remains, and the creature's inside is terribly torn as it drags itself away, and it soon perishes. If the sting were a separate and independent construction, designed entirely as a weapon, it might be compared with some of the cheap guns sent by Birmingham to Africa, which cannot be let off without injuring the shooter; but when its parts are found to be modifications of a set of organs belonging to large groups of insects, and subserving a variety of purposes, we can admire them for what they will do, and think less of their defects.

The Queen Bee has a sting curved like an Eastern dagger, and uses it in a murderous duel with any rival of her own sex, and the victor, if escaping whole from the fight, has nothing more to do with war's alarms, and if she does not turn her spears into pruning hooks, employs them in the peaceful purpose of assisting in the deposition of the many thousands of eggs she has to lay.

The variations of structure and function which the anatomist and physiologist trace in plants and animals proceed according to laws very imperfectly understood. Important modifications are concurrent, and mutually adaptive. In the Hymenoptera the mouth organs and the abdominal ones are suited to each other, and their internal organisation corresponds. Bees and ants stand highest in intelligence amongst insects. The order they belong to is a very large one. In this country it is reckoned that we have 3,000 species. Amongst so many there is room for a great variety of modifications, and it is very interesting to trace them in their mouths, legs, abdominal instruments, and nervous development. Insect phrenology is a very difficult study, but small as the brain is in the ant and the bee, it suffices for manifestations of intelligence as well as blind instinct, which leads Sir J. Lubbock to say that the chimpanzee and the gorilla must give way to them. All these creatures have to take care of their posterity. The bees store the honey that is to feed their young. "In the case of wasps, the larva requires animal food, and the mother therefore places a certain number of insects in the cell, each species having its own special prey. *Cerceris buprestida*, as its name denotes, attacks beetles belonging to the genus *Buprestis*. Now if the Cerceris were to kill the beetle before placing it in its cell, it would decay, and the young larva when hatched would find only mass of corruption. On the other hand, if the beetle were buried

uninjured, in its struggles to escape, it would be almost certain to destroy the egg. The wasp has, however, the instinct of stinging its prey in the centre of the nervous system, thus depriving it of motion, and, let us hope, of suffering, but not of life; consequently, when the young larva leaves the egg, it finds ready a sufficient store of wholesome food."*

Fig. 1.—Sting of bee; *a*, Tip of lancet, more enlarged. Mr. Gosse exhibits a rounded projection, usually overlooked, which serves to guide the sting in the broader part of the sheath.

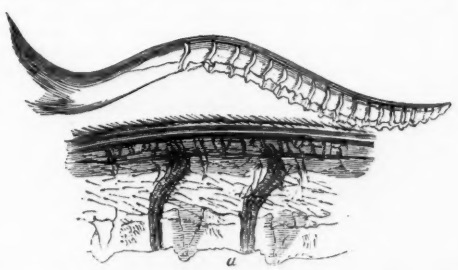


Fig. 2.—Outer saw of saw-fly; *a*, a portion more enlarged.

The drawing, Fig. 1, is copied from Gosse's admirable "Evenings at the Microscope," by far the best book of its kind. It represents the various parts of the bee-sting, together with the poison-bag. The tip of the sting is much like a saw, and this form, on a much larger scale, appears in the saw-fly, as shown in Fig. 2, also taken from Gosse. Besides an outer pair of these tools, the insect has an inner and finer pair, and each tooth is itself serrated. It would require a volume to explain the variations in the abdominal tools of the Hymenoptera. All require what in man would be called skill to work, and it is perfectly wonderful to find these creatures in possession of such apparatus, and of the central organisation which guides it to its proper use.

* Sir J. Lubbock's "Origin of Insects."

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Agnosticism is of the essence of science, whether ancient or modern. It simply means that a man shall not say he knows or believes that which he has no scientific ground for professing to know or believe. Consequently (Dr. Huxley goes on), Agnosticism puts aside not only the greater part of popular theology, but also the greater part of popular anti-theology. On the whole the "bosh" of heterodoxy is more offensive to me than that of orthodoxy, because heterodoxy professes to be guided by reason and science, and orthodoxy does not.—*Professor Huxley.*

"Heath's Fern Portfolio" is the general title of a series of life-size reproductions of ferns, in which the author of "The Fern World" will give what has never before been attempted, namely, absolute *facsimiles* in form, colour, and variation, of those beautiful plants, together with letterpress descriptions on the same plates. Mr. Heath's new serial will be published monthly by Messrs. Sampson Low, Marston, & Co.

Scientific Hallucinations and Emotional Truths.—Do the strictest reasoners form a body of men hitherto free from false conclusions and illusory speculations? The driest argument has its hallucinations, too hastily concluding that its net will now at last be large enough to hold the universe. Men may dream in demonstrations, and cut out an illusory world in the shape of axioms, definitions, and propositions, with a final exclusion of fact signed Q. E. D. No formulas for thinking will save us mortals from mistake in our imperfect apprehension of the matter to be thought about, and since the unemotional intellect may carry us into a mathematical dreamland where nothing is but what is not, perhaps an emotional intellect may have absorbed into its passionate vision of possibilities some truth of what will be—the more comprehensive massive life-feeding theory with new material, as the sensibility of the artist seizes combinations which science explains and justifies.—*George Eliot.*

Bedford College, London.—This College has again this year sent up a very large proportion of the successful women candidates to the examinations of the London University for B.A. and B.Sc., the results of which have just been published. Of the twenty women who have taken the B.A. degree this year, nineteen have been placed in the first division, and of these nineteen as many as eight are from Bedford College, London, while the remaining eleven come from University College, London, Cheltenham College, Bowdon, Edinburgh, and some are prepared by private tuition. Nine candidates went up from Bedford College, London, therefore all have passed except one, and all are in the First Class, the College course having been found sufficient to prepare them for the examination. Only four women have been placed in the class-list of the B.Sc. degree—one from University College in the First Division and three others in the Second Division. Of these three, one is from Bedford College, London, and the other two have prepared by private study. Thus out of the twenty-four successful women in these examinations, Bedford College, London, can claim to have prepared more than one-third of the whole number.

XUM

## Editorial Gossip.

I FIND that some even after careful study find the puzzle about American trains between New York and San Francisco perplexing. It may be thus dealt with. Suppose the journey to last exactly seven days, and the startings from New York and San Francisco to be simultaneous. Then if A represents San Francisco and H New York, the distance A H contains seven days' journey, A *b*, *b c*, *c d*, &c. Now when a train is starting from A one is also starting from H for A, another is a day's journey from H at *g*, another at *f*, another at *e*, at *d*, at *c*, and at *b*. These seven trains are of course all passed by the San Francisco train on its way to New York; but during the seven days (exactly) that this journey lasts, seven more trains start from H, the seventh starting just as the San Francisco train reaches H. This last is not *passed* by the S.F. train, any more than was the train from New York which reached A just as our S.F. train was starting. But the other six must all be passed before the S.F. train reaches New York. Hence the total number passed is 7+6 or 13. If the S.F. train starts a few minutes or hours before a train reaches A, then it is easily seen that the total number passed is 14, one being passed at the beginning of the journey and all the first six from New York after the journey began. So also if the S.F. train starts from A a few minutes or hours after a train reaches A, still 14 trains are passed, for in this case seven are already on their way from New York, and seven more start before the S.F. train reaches New York. Consequently as the starting of the S.F. and N.Y. trains at the same precise moment is not the probable order of things, we may say that—save for this exceptional case—the right answer is 14.

| S.F. | . | . | . | . | . | . | N.Y. |
|---|---|---|---|---|---|---|---|
| A | *b* | *c* | *d* | *e* | *f* | *g* | H |

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COMPARING the following account of the origin of the word Masher, by Mr. Howard Paul in *Society*, in which the true origin of the word is given with my own, it will be seen that my recollection was tolerably correct:—

The term "masher" originated in the green-room of the Union Square Theatre in the autumn of 1878. Two comedians attached to this popular establishment were extremely fine-looking men, Mr. M'Kee Rankin and Charles Thorne (both of whom, by the way, have played in London), and were immensely admired by the susceptible maidens of the great Empire City. These two gentlemen were the redoubtable heroes of *matinées*, and the ladies went so far in their *petits soins* as to send them *billets doux*, button-hole bouquets, and frequent anonymous *souvenirs*. Naturally there was some rivalry between the two actors, but they remained the closest friends. At a *matinée* where the audience consisted almost entirely of ladies, Thorn entered the green-room after a strong scene, and said, "Mac, I've done fearful slaughter to-day. Do you hear that applause? Listen to the gloved darlings." Rankin, who was in a gay mood, and enjoyed the highest animal spirits, replied, "Charley, I'm nowhere in this 'rig' (alluding to his costume), I only *touch* their hearts, but, by the gods, you *mash* 'em. "Ha, ha!" laughed Thorne, "mash is a good word." "Yes, my boy, you are the champion masher!" returned Rankin, and the actors in the green-room repeated the word admiringly. At the conclusion of the performance the two Lotharios, as was their wont, called in at the bar-room of the Union-square Hotel for a "tod," to use the local locution, and over their cocktails mentioned the phrase to a knot of journalists who were refreshing themselves. One of them, Mr. Chandos Fulton, made a note of it, and a week after, in the columns of the well-known theatrical paper, the *Sunday Mercury*, he wrote a sprightly article, "Heart Mashers at Matinées." The term "tickled the town," as Tony Lumpkin would say; the actors, the sporting fraternity, and men about town instantly adopted it, every well-dressed, smart young man was individually called a masher (much as we call well-got-up men here swells), and the phrase was brought to England by the actors who are incessantly crossing between the two countries.

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THE *Daily News* in a pleasant notice of my lectures dwelt more on the things running through them than I think desirable. The following remarks of mine on this point, and on the question whether declamatory arts are desirable in a lecture may be worth reproducing here:—

Your very kindly notice of my first lecture at Kensington is (in a sense) pervaded by an error which I am anxious to correct. Your reporter most have overlooked certain remarks which I made while the lights were being turned down and the lantern got ready for action. They were to the effect that the theory running through the lecture, the theory that worlds, like plants and like animals, have a life of their own, whose stages have certain characteristics which we may infer by reasoning and test by observation, was not what I wished my audience chiefly to consider; but rather the facts which were presented in association with that theory. "The theory," I said, "is but a thread on which I propose to string the pearls of known facts." Experience has shown that to state a series of facts, however interesting in themselves, is not sufficient to interest an audience who are not all experts in the subject—whatever it may be—to which those facts relate. The facts must be associated in some way by which the imagination may be interested and the memory assisted. In like manner, when dealing with the sun, I take a theory as to the origin and nature of sunspots which associates all known facts about them, and also about the coloured flames and the corona; but I am careful to point out that the value of the facts in no way depends on the strength of the thread of theory on which they are strung. In dealing with the moon I conceive a theory of successive stages of her vulcanian history, her existence as a probable abode of life, and her present condition; but the interest of the facts associated with this theory would remain if the theory should be disproved. I believe all three theories to be in the main correct, simply because they can thus be associated with all the facts at present known; but I by no means insist on their truth. I may remark here that there is some mistake about my "starting with Mr. Herbert Spencer's assumption that the world and the other planets of the solar system may be compared to 'cooling cinders.'" Last night was the first time that I ever referred, in my lecture on the "Life of Worlds," to that passing illustration in Mr. Spencer's masterly essay on the Nebular Hypothesis. I used it merely as a convenient illustration of the way in which large bodies retain their heat longer than small ones of the same kind.

One word more. There is a remark at the close of your report suggesting that declamatory arts only were required to make my lecture in a high degree impressive. During the fourteen years that have passed since I gave my first lecture, I have earnestly striven to rid my delivery of every trace of declamation. The great art of scientific lecturing, as compared with oratorical appeal, consists, I am convinced, in keeping the petty personality of the lecturer (necessarily petty in the presence of the great truths he is describing) from being obtruded, as it tends to be, between the audience and the subject of discourse. The arts of declamation all tend to bring the speaker's personality before the audience. And not only must they, in my opinion, be avoided, but, where they have been in any degree acquired, they must be carefully unlearned. If they rendered a lecture more pleasing the case would be different; for though the object of a lecture is to instruct rather than to impress, instruction is all the better for being made attractive. But my experience teaches me that an audience finds declamatory arts in scientific lecturing not pleasing but offensive.

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## THE FACE OF THE SKY.

FROM NOV. 23 TO DEC. 7.

BY F.R.A.S.

THE sun is getting low down in the sky, but should be examined on every clear day, within an hour or two of noon, for spots and faculæ. Maps XI. and XII. of "The Stars in their Seasons" may be consulted for the aspect of the night sky. Mercury is invisible, as is, in fact, Venus too; but Mars is nightly coming into a better position for the observer—in fact, by Dec. 7, he rises about 8h. 53m. p.m. He is in the blank part of the sky, west of Leo ("The Stars in their Seasons," Map III.). He still presents a very small disc, but it is large enough for the observer to see that it is "gibbous"—*i.e.*, not round, but like the moon when two or three days from the full. The Polar snow, and indications of dark markings, too, are beginning to be perceptible in a moderate telescope. Jupiter rises about 8h. 27m. this evening, and by Dec. 7

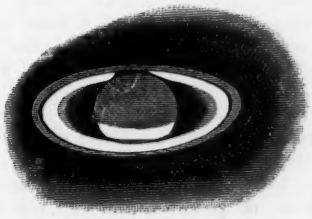
will rise an hour sooner. Hence, about midnight he is well up in the sky, in which he is now by far the most brilliant and conspicuous object. He remains in Cancer. The phenomena of his Satellites visible before 1 a.m. during the next fortnight are:—First, the egress of the shadow of Satellite I., to-night (23rd), at 10h. 38m.; followed by that of Satellite I. itself at 11h. 47m. Then, on Nov. 25, Satellite IV. will re-appear from occultation behind Jupiter at 12h. 38m. p.m. On the 26th, the shadow of Satellite III. will enter on to Jupiter's face at 10h. 40m. p.m. At 12h. 56m. 49s. on the 29th, Satellite I. will disappear in eclipse. On November 30, the ingress of the shadow of Satellite I. will happen at 10h. 12m. p.m., followed by that of the Satellite casting it at 11h. 16m. The shadow will pass off the disc of the planet at 12h. 32m., the Satellite not until the next morning. On the night of December 1, Satellite I. will reappear from occultation at 10h. 45m.; and Satellite II. disappear in eclipse at 11h. 32m. 27s. On December 3, the shadow of Satellite IV. will leave Jupiter's face at 10h. 6m., and forty-three minutes later Satellite II. will also pass off the planet's disc. Satellite III. will reappear from occultation at 11h. 58m. p.m. on the 7th, and six minutes after midnight the shadow of Satellite I. will begin its transit over Jupiter. Saturn is visible all night long, and is excellently placed for the observer. No more wonderful or interesting telescopic object than this planet exists in the heavens. Uranus is still invisible. Neptune is visible all night long with sufficient optical aid, and is travelling to the south of $\delta$ Arietis ("The Stars in their Seasons," Map XII). Pons's Comet, to which reference was made on p. 292, will during the next fortnight travel in an easterly and somewhat southerly direction, through that very blank region of the sky to the extreme north-west of the constellation Lyra. The moon is 23·5 days old to-day at noon; and, of course, 29·5 days at the same time on the 29th. Then at noon on the 30th she will be 0·7 days old, and 7·7 days old at mid-day on December 7. Hence she will scarcely be visible for the observer's purpose before December 3. No occultations of stars occur during the next fourteen days. At four o'clock this afternoon the Moon will leave Leo for Virgo; through which constellation she will continue to travel until 4 a.m. on November 27, when she passes into Libra. Her passage through Libra occupies until three o'clock in the morning of the 29th, at which time she enters the northern strip of Scorpio. She takes thirteen hours to cross this, and at 4 p.m. of the same day emerges in the southern part of Ophiuchus. Here she continues until 5 a.m. on December 1, when she crosses into Sagittarius. She does not quit Sagittarius for the northern part of Capricornus until midnight on December 3, and at five o'clock the next afternoon travels into Aquarius. Here she remains until 10 a.m. on December 7, when she enters Pisces. We there leave her.

## SATURN IN A THREE-INCH TELESCOPE.

By a Fellow of the Royal Astronomical Society.

INASMUCH as it has been represented to us that our notices on pp. 313, 221, and 220 respectively of ol. I. of the planets Mars, Jupiter, and Saturn, as seen 3-inch telescope, were of too curt and merely incidental a character, and that somewhat fuller information is needed as to the aspect of these planets in such an instrument as that whose use we are presupposing; we now purpose to enter, in three separate papers, rather more into detail of the phenomena which they present in a 3-inch telescope, and to give the necessary information concerning all that the student may reasonably expect to see of them with it.

Coming as Saturn does into opposition to the sun during the early morning of November 29th, with his rings nearly at their greatest opening, and southing in this country at an altitude of between 50° and 60°, the planet could hardly be in a more favourable position for the observer than he is at present. He will be found in the sky just now to the north and west of Aldebaran ("The Stars in their Seasons," Map I.), and will be instantly identified by the leaden hue of his light as contrasted with the red colour of "The Bull's Eye." The subjoined sketch of the planet was made at the telescope with a power of 204 on the night of November 13th, at 11h. 45m. p.m.

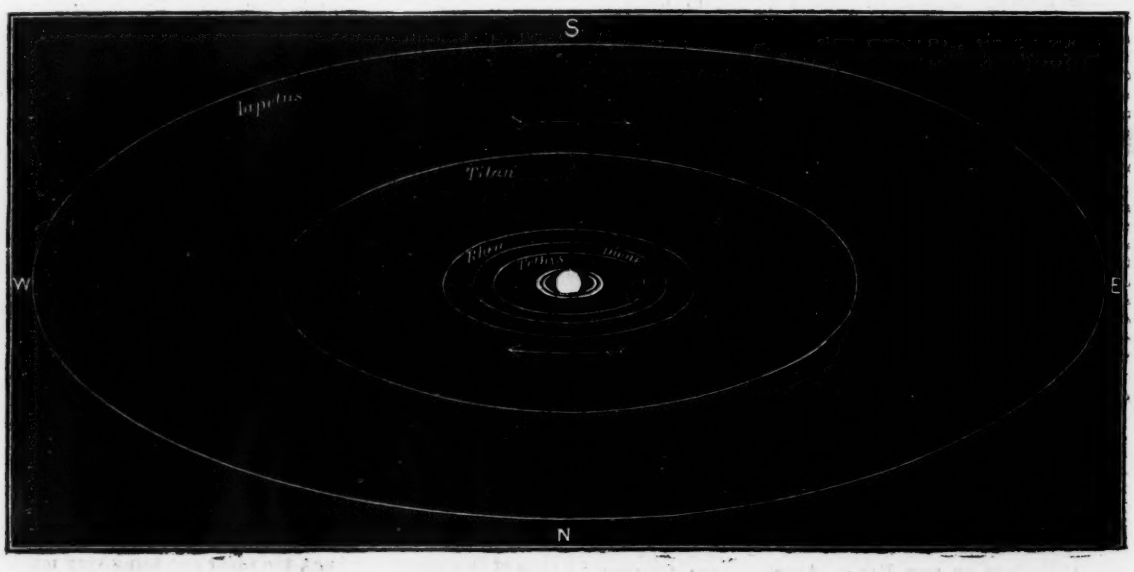


Saturn, 1883, Nov. 13, 11h. 45m. G.M.T., power 204.

The flattened figure of the planet will at once strike the observer's eye. In other words, he will note that instead of presenting a circular disc, the outline of Saturn is very perceptibly elliptical—or, as it is commonly called, "oval"—the longest diameter of the ellipse being in the direction of his equator. Technically, his figure would be described as an oblate spheroid, which, put into plain English, means that instead of the planet being a perfect sphere, he is, as it were, turnip-shaped, *i.e.*, flattened at the poles and bulged out at the equator. This effect of the rapid rotation of Saturn needs no further mention here. The southern part of the globe (that which is uppermost in the telescope) will be seen to be covered by a perceptible dark shading, which, however, terminates with a well-defined edge not far from the planet's equator. Below (north) of this is a bright equatorial band. The general yellow tint of the ball is also a notable feature. Where the ring crosses Saturn's disc a broad line of shading will be observed, and a careful and attentive study of this under good definition will show that it consists of two parts, a dark, broad line of shading crossing, as we have said, the face of the planet; and seemingly superposed upon it, and in contact with the inner edge of the ring, a very narrow *black* line. This latter is the real shadow of the ring upon the planet. The broader stripe is a part of the strange interior dusky or "crape" ring, of which we are to speak immediately. If we turn now to the ring itself, we shall perceive that it really consists of two concentric ones, the inner one being very much broader, and notably brighter than the outer one, or than the dusky capping on the southern hemisphere of the planet. A narrow dark line will be seen to separate the inner ring from the outer one. In telescopes of 4 inches of aperture and upwards this dark division is traceable right round the ring. With a 3-inch telescope it will, under favourable circumstances, be well seen in the "Ansæ" (the eastern and western portions of the ring), but will scarcely be fairly discernible entirely round. At moments of the best definition the shadow of Saturn will be seen, as drawn above, projected on the inner ring only, the black line, known from its discoverer as "Cassini's Division," at once bounding it and the planet's south pole on the south. The "crape" ring to which reference has previously been made is just beyond the power of our instrument. On nights when atmospheric conditions admit, however, of the use of a high power, faint indications of it may be seen in the form of a seeming ill-defined shading away of the inner edge of the broad interior ring, in the Ansæ. No connection, though, is traceable between this and that portion of the dark ring which is seen crossing Saturn's disc; albeit in larger instruments the whole

elliptical outline is seen to be continuous—save, of course, where the planet itself is superposed on it. The rings are known to astronomers as A, B, and C; A being the outer ring, separated from B, the broad bright inner one, by Cassini's division, and C, the innermost crape ring, which we have just been describing. Ring A itself has been seen to be further cut into two by a division known as Encke's; but assuredly this has never been effected with a 3-inch telescope.

Saturn, as may be learned from every primer of astronomy, is attended by eight satellites, of which three are wholly invisible save in large and powerful telescopes. We find, however, that in speaking of those named Tethys, Dione, and Rhea, on p. 221 of the first volume of KNOWLEDGE, as "too severe tests for a 3-inch object-glass," we were really doing an instrument of that size an injustice. By hiding Saturn behind a very thick wire in the eye-piece, or by any cognate contrivance, Tethys and Dione may sometimes be glimpsed on a dark night. Rhea was even visible in the bright moonlight while the sketch of the




planet given on the previous page was being made, and we fancied (although it may have been only fancy) that Tethys sometimes flickered up for a few consecutive seconds at distant intervals. Inasmuch then as, under sufficiently favourable circumstances, the possessor of a first-class 3-inch telescope may hope to perceive four, or even five, out of the eight satellites by which Saturn is attended, we here give a drawing to scale of their orbits, by the aid of which the student may recognise them.

The arrows show the direction of their motion, in connection with which it may be noted that, at first sight, this motion may seem to be *retrograde*. It must, however, be borne in mind that we are looking at Saturn's south pole, and, so to speak, viewing the orbits of his moons from underneath. In 1899, when the north pole of the planet will be presented to us practically as the south pole is at present, the satellites will be seen to be travelling in the same direction as those of Jupiter, or as our own Moon, &c. Tethys and Dione must always be difficult objects in a small instrument, and require, as we have said, the planet to be hidden, and a moonless sky, to be even glimpsed in a 3-inch telescope. Rhea is a little easier, but will be best seen when at its greatest east or west elongation. Titan shining as a small eighth magnitude star is practically always visible. It occasionally transmits the disc of Saturn, and under these circumstances its shadow has even been seen as a tiny black dot, crossing the face of the planet, with only $2\frac{7}{8}$ in. of aperture. The light of Iapetus is (from some cause at present imperfectly understood) variable. This satellite is very markedly brighter when at its western elongation.

Such are the most salient features of this wonderful planet, as seen in a small telescope. We can only express a hope that our description of them may set the student seriously to work examining them for himself, with the best instrumental means he can obtain. The interest which the contemplation of so wonderful and beautiful an object must perforce excite, will, almost of necessity, induce a desire for fuller information concerning it. For such information, of a practically exhaustive character, no better or more interesting a work could possibly be found than "Saturn and its System," * by the Editor of this journal, which has been described, with perhaps as little flattery as ever appeared in a critique, as "one of the most masterly monographs on an astronomical subject in the English language."

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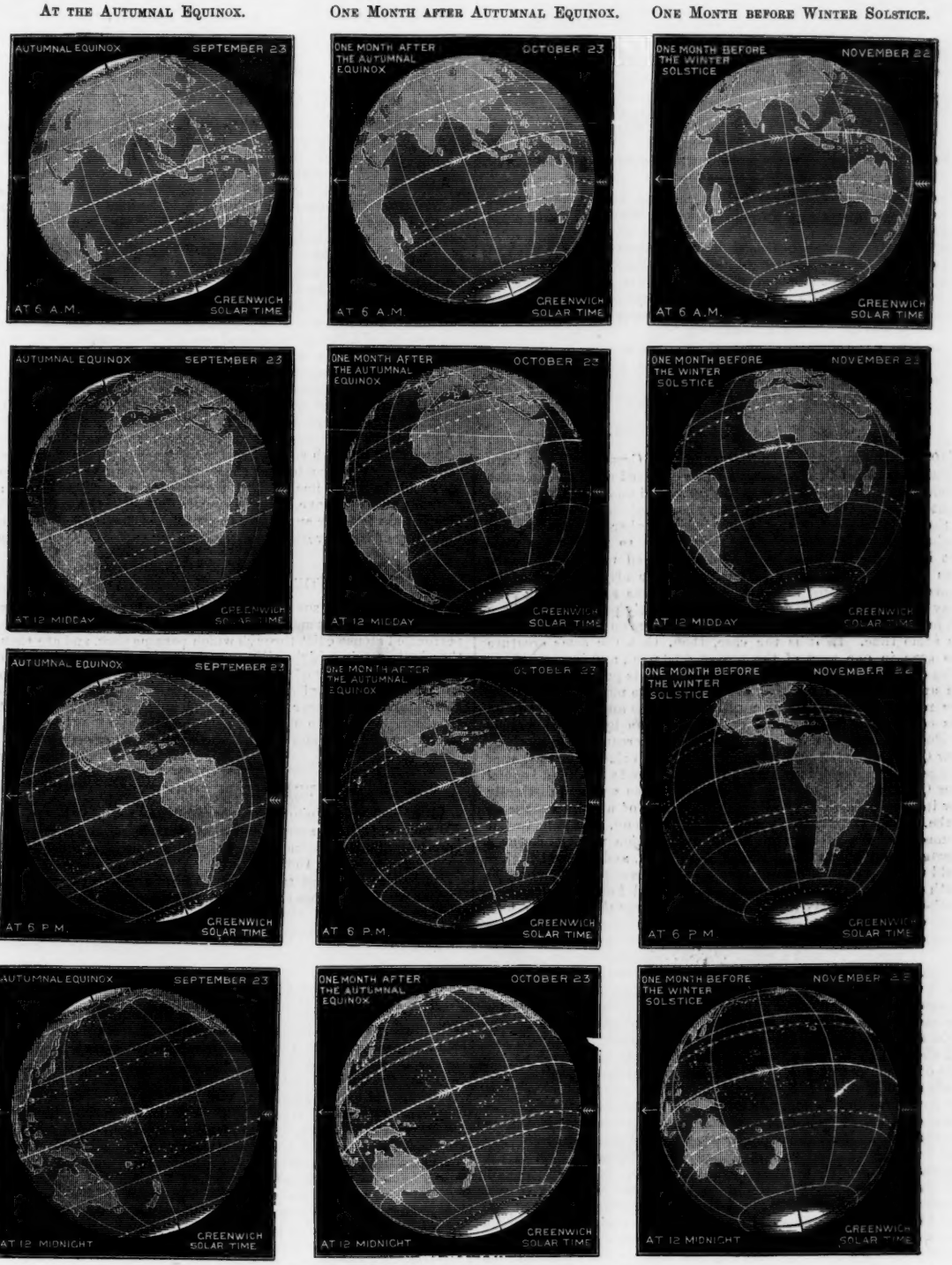
THE *Railway Review* (Chicago, Sept. 15) devotes considerable space to the discussion of the question of standard time, now occupying much attention in America. It reprints a letter published in the *Railway World*, urging the adoption of noon by Greenwich time as the universal railway standard, and counting from it all round the clock, the twenty-four hours being each simultaneous all over the continent. The suggestion which it advocates, however, is the less sweeping one of Mr. W. F. Allen, secretary of the time conventions, who proposes that North America should be divided into five sections, as follows:—First, the intercolonial, with a central meridian 60 deg. west of Greenwich; second, the eastern; third, the central; fourth, the mountain; fifth, the Pacific division, the central meridian of each being 15 deg. from that of the next, and the difference of time throughout each being precisely one hour.

* London: Chatto & Windus.

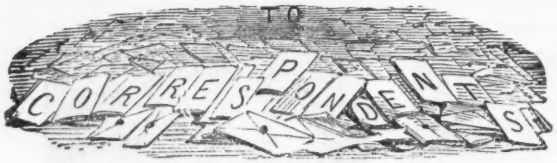



# SUN VIEWS OF THE EARTH;

## OR, "THE SEASONS ILLUSTRATED."

By Richard A. Proctor.

I GIVE this week the Sun Views for the month, showing the aspect of the earth as supposed to be seen from the sun at six in the morning, noon, six in the evening, and midnight, Greenwich solar time, a month before the winter solstice. For comparison, the Sun Views for September and October are repeated.




"Let Knowledge grow from more to more."—ALFRED TENNYSON.

*Only a small proportion of Letters received can possibly be inserted. Correspondents must not be offended, therefore, should their letters not appear.*

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## STRANGE SEA CREATURES.

[1016]—In your article on "Strange Sea Creatures," you have doubtless been led to suggest that I was deceived as to the creature which I am convinced was seen by my friend and myself at Bude about three weeks ago, by the very short statement which I sent to the *Times*. Since I sent that notice further information has reached me, which may possibly induce you to modify the view that it was an inanimate object which passed us. The distance from Bude to New Quay is by sea very nearly 40 miles. The creature, which passed us about 4.20 p.m., was seen passing New Quay at 5.30 p.m. the same day. It is scarcely possible that there can have been *two* uncommon marine monsters on this coast about the same time. If it is the case, then, that the *same* creature was seen in one part of the sea at 4.20 p.m., and in another, 40 miles off in an hour and ten minutes after, it is pretty certain that the appearance was not that of an inanimate mass of sea wreck. The rate of movement was much faster than any sea-current on this coast would carry an object. It was seen by several persons at Bude. Some men at work first saw the creature approaching New Quay, and compared its progress through the water to that of a huge rat. Three ladies watched it from the next headland beyond New Quay, a height of 80 or 90 feet above the sea, and distinctly saw its head, which they said was like that of a huge conger or snake. They state that it was about 50 feet long, that it left what seemed to be a greasy trail in its wake, which was visible for a quarter of an hour after it was lost to sight, and by which they could trace its course. It was seen also by persons about two miles north of Bude, coming down towards the land from the open sea, north-west of us. My first impression of it was that it was a long boat, which had got adrift from some ship, but the unusual length surprised me. Then I soon saw that no boat or large log of wood could be moving at such a rate. Having no telescope at hand, or within reach, during the short time the creature was in sight, we could make out nothing distinct as to the shape of the creature. It went through the water apparently without much exertion, for we saw no commotion in the water as it went along. It was in sight the *whole* time, till it was lost in the distance.

I should like to know whether a calamary would travel at the rate of this creature, and with the same regularity. I am told that a whale would go beneath the surface, and not proceed in the same steady course as this creature did. It was my own impression at the time, and has been ever since, that its movement most resembled that of a huge rat swimming very swiftly through the water; and I was glad to find that it coincided exactly with that of the men at work at New Quay.

I quite agree with your conclusion that there are many species of marine animals of which we know little, or even nothing at all; and I shall be glad if this plain statement of what was seen here induces the sceptical to believe this. Fragmentary observations, when properly pieced together, may increase our knowledge of the wonders of the deep. E. HIGHTON.

Bude Vicarage, *Nov.* 3. 1883.

P.S.—Admiral Jones' experience is not much to the purpose.—E. H.

[I am much obliged to Mr. Highton for his very interesting communication. I intended to suggest rather the possibility than the probability that one of those singular illusions produced by the movement of masses of matter like seaweed in a disturbed sea may have accounted for the sea monster he seemed to see. I am myself one of those who regard the rejection of all such accounts in that way as altogether unscientific.—R. P.]

## A MOONLIGHT ASCENT IN A BALLOON.

[1017]—The distorted appearance of the earth's surface as seen from a balloon during sunlight, is not the same as that seen from a balloon during moonlight. In the latter case it has more the form of a spherical or convex than that of a saucer-like or concave aspect. Describing his moonlight ascent from the Crystal Palace in August, 1866, when eight persons accompanied him, Mr. Coxwell says:—"But what impressed me as worthy of more particular attention, and I have frequently observed it before, was the great contrast between the view of the earth by day and that by night. By daylight the surface of England has that beautiful bowl-shaped and variegated appearance, with every conceivable hue and form, which no picture, and only a widespread landscape can possibly offer to notice. By moonlight you are able to observe for a circle of a few miles around you the hedgerows, trees, woods, and water, and even to detect shades of difference in the colour of the fields; but away towards the horizon, where it is dark and yet visible, you observe more the planetary and material form; and if by any unseen and invisible means one could be suspended at tolerable altitude, the idea would certainly be uppermost that an approach was being made to the confines of some vast globe, where immediately beneath you there were signs of busy life and cultivated soil. The general contour of the earth strikes one as coming nearer by night to what imagination pictures of a world in space; it assumes a less concave, if not a convex form, and the subdued light of night shades over and above the black horizon strongly define the boundary of the terrestrial matter from space." J. DYER.

## PERFORATED STONES IN INDIA.

[1018]—Perhaps some of your readers or correspondents may be able to give me information as to the exact localities in India where perforated stones exist through which persons pass, and are thought thereby to attain a higher life or to become new-born in the same sense that the rulers of Travancore, being of the Nair caste, become Brahmins by passing through a golden cow or lotus. I believe one such stone exists near Bombay, and another in Guzerat. Any details regarding the use and actual position of either of these stones, or of any others of the same nature, will greatly oblige.

COSMOPOLITAN.

## STRANGE PHENOMENON.

[1019]—The folloing extract from a private letter, dated Kurrachee, Oct. 14, seems somewhat remarkable, following on your correspondent's mention of the green sky which has caused so much perplexity of late in India:—

"The weather is getting pleasant now, and every evening after sunset we have a most extraordinary brilliant glow in the sky. As it is over Mecca, the Mussulmans think it portends the arrival of the Messiah, or some other terrific event."

*Nov.* 15. MAJOR AB ADVERSIS.

## ANTHROPOMETRY.

[1020]—Though not possessing any scientific knowledge of ethnology, yet emboldened by Mr. Grant Allen's expressed desire for information about the peasant-farmers of my native county, I gladly offer the small mite of my personal experience for the benefit of that gentleman, whose charming papers in KNOWLEDGE have been the source of much pleasure to me.

Six or seven miles from the capital of North Tipperary, in the valley surrounding the hamlet of Templederry, there used to be in my childhood one of the finest race of men I have ever seen. Judging from their surnames alone, the inhabitants of this valley must have been of mixed blood, partly English and Welsh, as well as Irish, for while there were O'Bryans and O'Learys, there were also Vickers and Gilmartins among the Catholics, and Powells and Howells among the Protestants. It was a sight on a fair or market day, to see the well-clad well-fed, and well-mounted peasant-farmers of Templederry ride into the little assize town of Nenagh, with their bright-complexioned faces beaming with good humour and independence, and their short frieze capes flying in the air behind them. The mere sound of their merry voices and happy laughter seemed to impart vitality to the listener.

They were mostly over six feet, and were broad-shouldered, deep-chested, fair or florid complexioned men, and many of them had the unmistakably narrow English oval shape of face and head.

Protestants of this valley were generally styled Palatines by the Catholics, but I can't say whether they were aware that this title was derived from the English settlers of the Pale. The farmers of Templederry were specially favoured both by circumstances and surroundings. Their land was very fertile, there was abundance of good food, and the air from the neighbouring hills was at once balmy and invigorating, and imparted to those who breathed it a buoyant elasticity.

In the nearest town, I know at present three young men (brothers), who range from 6 ft. 2½ in. to 6 ft. 4 in. in height, and as the youngest (who is *not* the shortest) is only seventeen, I take it for granted that they may still grow taller.

Now these young men, who are very patriotic, would be incredulous, as well as indignant, if told that their name was an old Yorkshire one, and that their father had a decidedly English face.

My experience of the peasantry on the west coast of Ireland does not lead me to conclude with "Hallyards" that men living on the sea-board are larger and taller than those inland. On the coast of Clare, in the neighbourhood of Skilkee, or thereabouts, the peasantry struck me as of a totally different type from the same class of men in Tipperary. They were much smaller and slighter, had generally dark hair and eyes, and were mostly sallow or pale complexioned, and lacked altogether the bright fresh colouring of the Tipperary farmer. It is true that here and there one might come across a fine young fellow, with dark flashing eyes and wild romantic mien, but this was the exception and not the rule. On the other hand, the women of this district had the advantage over the men in both face and figure.

I have seen some very handsome peasant women in Clare. I have no recollection of hearing any English surnames in this part, nor did I notice anyone possessing the English type of features. Along the coast from Clare to Ballyvaughan and farther on, many of the fishermen seemed to me particularly undersized, rather of the squat broad Dutch make.

It cannot be altogether race which makes this difference, for, setting aside the question of peasantry, some of the old Irish families on the west coast have been noted for generations for their handsome faces and splendid figures, and among them to this day there are to be found men every whit as fine-looking as in Tipperary.

Sea air is a tonic which requires the addition of good food to draw out its properties, but sea air alone is of small avail to give height and strength to badly nourished, badly clad, and overworked bodies.

Mr. Grant Allen would find in "The Making of England," by the late Mr. Green, many interesting items about the English settlers in Ireland,—I am, Sir, yours sincerely. E. O'SHEA DILLON.

*Nov.* 3, 1883.

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[1021]—I never meant to dispute such an obvious fact as that one race is short, another tall. I only cherish a doubt as to whether it is a question of race or of habitat. Our American cousins are certainly often like Red Indians; yet there has been no intermarriage. The descendants of the English in Ireland are *ipsis Hibernis Hiberniores*. I have remarked that Australians born are less intelligent than members of the same race born at home. The character of the modern French—a very mixed race—is the same as that Cæsar gives of the pure Celts of Gaul in his day, "novis rebus studentes." Modern Greeks have most of the characteristics ascribed by Roman authors to the ancient Greeks, and yet it is asserted they are of Slavonic race.

Admitting that the Scottish Lowlands are of diverse origin, I still question whether the seaside men are of a race which does not also exist largely inland. In Normandy, England, Ireland, &c., we do not find conquering races sticking always at the coast. If Tipperary men are, as is said, Cromwellians, surely that is in favour of my contention; for there is no English militia regiment of Grenadiers over 6 ft. HALLYARDS.

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## GREEN SUN AND SOUND WAVES FROM KRAKATOA.

[1022]—In the early part of September there was great excitement here in consequence of the dimmed light, blue and green tinted, of the rising and setting sun, which was, indeed, very remarkable. Miss Pogson attributed it to the presence in our atmosphere of sulphurous vapours from the recent Krakatoa eruption, the distance of which from Ceylon is 2,000 miles. By a good many other people the great sun-spot then visible was blamed as the cause of the phenomenon. I send you a cutting from our local thunderer, which is not an illustrated paper, except in times of great excitement. I think it is a curiosity in its way! But my chief object in writing to you is to ask a question. Not only was our sea greatly agitated, but the volcanic explosions of Krakatoa were distinctly heard in all parts of our mountain zone, if not also in the surrounding low country. I heard them myself, exactly as though there was heavy gun-practice a few miles off, or dynamite rock-blasting a mile or so away, sharp and loud. What I wish to ask is: did these sound-waves travel through the air, or through the earth's surface-crust, causing the sounds to be heard here as through an ordinary telephone-receiver? I may mention that the green tint of the sunshine on white walls was still markedly visible, though faint, a few mornings ago at sunrise.

Ceylon, *October* 17th. R. WADE JENKINS.

[I should say that the sound-waves were conveyed through the earth's crust.—R. P.]

---

## THE SEVERE WEATHER OF THE 13TH-15TH.

[1023]—I do not know whether any of your readers encountered such severe weather as we have had in this locality (S.W. of England). I give you the readings of my thermometers corrected at Kew to 0·1 deg., and exposed under the uniform conditions required by the Meteorological Society:—

| | | | |
|---|---|---|---|
| Night of 12th | ... | Minimum temperature on grass ... | 22·2 deg. |
| „ 13th | ... | „ „ „ ... | 22·3* „ |
| „ „ | ... | Minimum temperature in "Stevenson" screen (4 ft. above ground) ..... | 20·8* „ |
| Day of 14th | ... | Maximum temperature in screen ... | 36·7 „ |
| Night of „ | ... | Minimum temperature in screen ... | 22·8 „ |
| „ „ | ... | „ „ on grass ... | 21·1 „ |

And most noteworthy of all was the temperature of the air (dry bulb in screen) at 9 a.m. on the 14th, viz., 23·1 degrees.

I am only a novice in meteorology, but this latter low temperature seems almost unprecedented for the season and locality. On referring to the Meteorological Society's Weather Report for the 14th at 8 a.m., I cannot find any shade temperature in the kingdom lower than 28 deg., viz., at Parsonstown, and only one foreign station (viz., Haparanda) where the temperature equalled that of this place.

I should add that the altitude of this station is 376 ft. above the sea, also that a dense fog prevailed during most of the day (14th).—I remain, sir, yours obediently, H. J. POOLE,

F.R. Met. Soc.

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## JUPITER WITHOUT SATELLITES, OCT. 15, 1883.

[1024]—A friend sends me extracts as follows from *English Mechanic*, Oct. 26, 1883, p. 169:—"Jupiter, it appears, was not seen without satellites as predicted for Oct. 15. Several correspondents send notes of observations of the 3rd Sat., which was visible on the E. limb at 3.56, and about the same time the 'fourth' made its appearance on the W. limb; so that the *times* given in the 'Nautical Almanack' must be wrong." And again, same publication, dated Nov. 2, letter 21,986:—"Oct. 15 I saw Jupiter without his satellites, but two were really visible all the time, hanging on, one to each limb, &c.—M.A."

May I ask whether you are aware of any others who can clear the question as to the visibility or otherwise of satellites of Jupiter on Oct. 15, 1883, 3.56 a.m. to 4.15 a.m.? THOS. RADMORE.

[These discrepancies agree well with the evidence already obtained as to the variability of Jupiter's outline (his real surface being probably thousands of miles within it).—R. P.]

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## LETTERS RECEIVED AND SHORT ANSWERS.

J. A. L. ROBSON. Increase of earth far too small to affect her orbital motion. If her mass were doubled or trebled, her orbit would remain unchanged.—J. WHESTERBY. You were certainly right in having an astronomical eye-piece added to your refracting telescope. To use it, remove the terrestrial eye-piece, and having inserted the astronomical one, direct the instrument carefully on any convenient object, as a house-roof, which will divide the field very obviously into two different tints. Then push the tube in and out till you see the outline of the object becoming sharp and clear. After that you can use the focussing rack-work. It will now be right for that distance. If turned on the moon or a star it will be found to be out of focus, but not so much but that a slight movement will set it right.—J. L. FLEWETT. Thanks.—E. P. WESTLAKE. Regret that at present we have no available space for bee-culture. —W. SCHWEIZER. In my "Myths and Marvels of Astronomy" Swedenborg's world dreams are spoken of.—M. ST. VINCENT. None of your three sketches in the slightest degree resemble the moon's path.—E. W. Ought I not rather to ask such questions of you with your longer and doubtless wider experience? Besides I should want a list of the books of that kind which you have already read.—E. GROTH, M.D. Regret that the

* The difference marks the fog which existed at the time.

work is not known to me.—C. DAVISON. All those ideas about earthquake predictions based on mere coincidences,—about as trustworthy as the sun-spot influences on commercial crises and other such nonsense. Captain Delauney is a mere paradoxist.—T. KINMER.—We do not undertake to work sums.—C. STRETTON. Thirteen if the trains start simultaneously, otherwise fourteen. Thanks for date information, but the lines are known, and the reference to first table in Prayer-book rather complicates matters.—J. C. M. D. Letter forwarded.—A LADY MATHEMATICIAN. . . . . "By-and-by, 'O strange!' says she, 'what a noise there is in my ears, as if ten thousand paper-mills were going.' A little after she was at it again, 'Look, look, what is that I see yonder? It is just like the flame of a fiery furnace.' To whom the dame replied, 'Prithee, child, if you would have us allow you any sense at all, do not affect to show more than Nature has given you.'" *Æsop.* You see two or more can play at the polite "nonsense!" game. In fact, three or four. For you and I are 2, and Messrs. Foster and Clodd are 2: but you may believe in Mill's cheerful universe where 2 and 2 may be 3 instead of 4. Quaternions belong to the common sense of mathematics, and the square root of a negative number is only inconceivable if you insist that the square root shall be a number of a certain kind, just as the length of a line at right angles to another may become inconceivable if you insist that that length shall be regarded as measured along the other. The square root of a positive number is utterly inconceivable *if* the number represents time, or shillings, or pecks of potatoes. But the ideas which you seem to think conceivable (though Cayley and Helmholtz knew better than to say *that*) are about as conceivable as time progressing sideways, or as squared time, or the cube root of ten degrees of heat. If you will give us an essay on the quadrature of a time-circle I will tell you just how you are mistaken as regards Messrs. Foster and Clodd.—UNCERTAIN. Considering that the whole question is, *Where* are the limits? how shall we begin our inquiry by defining the limits? To use your illustration, it is as though France and Spain desired to determine their border line, and some one started at the outset the objection that the question could not possibly be dealt with till it had been settled what is France and what is Spain, which could not be done until the border line had been determined.—J. B. FINLAY would be obliged if Mr. Grant Allen would name the printers and probable cost of Dr. Hull's Geological Charts.—X. Y. Z. You might as justly argue that the return motion of a point along a line gives a second dimension.—THOS. PADMORE. Thanks. The points you note are interesting. They correspond to the fact, which has been shown by other observations, that the outline of Jupiter is variable.—C. COLLINGWOOD. Thanks, letters printed.—H. CHAPLIN. There seems to me no objection to the belief that downfalls of the kind would only happen occasionally, when the walls chanced to be unusually precipitous. Most mountain ranges would be free from danger. There may be much heat internally still, and almost certainly there is much water.—E. T. L. Calculate the effect; and "please find enclosed" in calculation the disproof of your earth-piloting theory. —A POOR STUDENT. *Vide Nautical Almanac* for right ascensions of Ceres, Vesta, Juno, and Pallas, at any given date. Your "present time" is so vague. Periods. 1 (Ceres), 4·61 years; 2 (Pallas), 4·62 years; 3 (Juno), 4·36 years; 4 (Vesta), 3·63 years.—J. J. SCARGILL. Certainly not fiery rain, but whether showers of falling stars looking like rain, or some purely local phenomenon, information too vague to enable me to say.—A CONSTANT READER. Oh come! I say!—look here, now!—it's all very well to give me a formula, and to say $h$ is so and so, $d$ something else, and $l$ such and such; but what does the "tottle of the whole" mean? *Is* it the discharge per second in gallons, or cubic feet, or what? Because if you will tell me what it is, I will tell you what you want to know. —W. GIBSON. I cannot find the duplication of the cube in your enclosure. Are you clear as to what the problem *is?*—S. L. B. I quite agree with you that the use of imaginary quantities differs entirely from such questions as quadrimensional space, non-Euclidean geometry and so forth. But I fear the subject would hardly please the readers of KNOWLEDGE. It seems generally forgotten that when we apply algebraical treatment to geometrical problems, we are not free to assume that everything involved in our geometrical subject matter is necessarily expressed in our analytical formulæ, and that these formulæ necessarily express nothing more than is involved in the geometrical relations we use them to illustrate. Thus when we take the equations $x^2 + y^2 = r^2$ and $x = d$, to represent a circle with radius $r$, having the origin of co-ordinates (right angled) at its centre, and a straight line at distance $d$ from one of the axes, we must remember that these equations do not in reality express these geometrical relations but only illustrate them. They are relations between matters measurable numerically, but not themselves numerical. In dealing with them we get other numerical relations, not all of which necessarily illustrate the geometrical relations we are dealing with. Thus if $d$ is greater than $r$, so that we obtain for the value $x = d$, $y = \sqrt{r^2 - d^2}$ an imaginary value so far as the geometrical illustrations involved are concerned, we need not therefore imagine that we have found evidence about imaginary space. It is worthy of notice that even the square root of a positive quantity has no analogue in space relations, if the positive quantity represents a straight line. So with time. Our numbers may represent time past or present; but when we get to their squares, cubes, or square roots, they have no relation whatever to anything connected with time. The expressions $a^2$, $a^3$, $\sqrt{a}$, &c., are fully as imaginary as the expression $\sqrt{-a}$ if $a$ represents a time-interval. Yet this does not prevent our dealing with $a^2$, $a^3$, $\sqrt{a}$ in problems relating to time, and getting correct and real solutions.—FREDERICK THOMPSON. I see no reason *why* your "pot of potatoes" should be scattered over the floor; so am at no pains to explain their quiescence. You think we rotundists want to immolate our opponents (save the mark!) as heretics. If you think that, you would think anything. I feel about as anxious to immolate the Flattists as I do to set fire to Earlswood Asylum. But wait at least till you have squared matters with Hampden and Parallax before you come rounding on me. You doubt whether there is any North Pole! Now, they respect it as the centre of everything. Why you will malign, next, the very meridians! But seriously what *can* you suppose it matters to me whether you understand or fail to understand the nature of the world you live on?—HY. LANCASTER, ED. RADFORD. You choose the hardest worked person you can find to do what you could easily do yourself. Do you imagine I keep a list of all the advertisements which have appeared in KNOWLEDGE? It is not so, I assure you.—A. MCCALLUM. Permit me to say that if I use KNOWLEDGE occasionally for my own purposes I pay for the privilege, and full value too. If I did not feel free to do so much as that, I should drop KNOWLEDGE rather quickly. The article on the Spencerian philosophy appeared in the last volume of my essays published by Messrs. Chatto & Windus.—L. S. M. P. *Quien Sabe?*

## Our Whist Column.

### BY "FIVE OF CLUBS."

THE question of the value of the signalling system at Whist has brought us many very interesting communications, from among which, with thanks to the rest, we select the following:—

### CONVENTIONAL RULES AT WHIST.

SOME months ago there was a very able discussion in the *Field* upon the policy of leading Ace originally, from Ace to four. There was, of course, the objection that such a lead simulated the lead of Ace, from Ace to five or more. On the other hand, some writers gave their experience that by leading a small card, from Ace to four, they had frequently not made a trick in the suit, the first trick having been won by the adversaries, and the Ace trumped upon the second round. I took no part in the discussion, but I may say, *en passant*, that I am in favour of leading a small card from Ace to four originally, and also in the course of the hand, unless, in the latter case, the play of the previous suits has shown an irregular division of the cards, in which event the Ace might be in danger. I am in favour of leading a small card as above because I am in favour of uniformity at Whist. I lay no stress whatever upon the argument that uniformity gives information to the adversaries as well as to the partner.

Success at Whist depends upon the faculty of combination and the rapidity and accuracy with which correct inferences can be drawn from the fall of the cards, and if information is to be withheld because the adversaries may make use of it for the purposes of their strategy the whole science of the game is gone. But there may be, and frequently is, what I call an *abuse* of uniformity; where, in order that his hand may be counted or his cards known, a player will under all conditions and without reference to the score play according to conventional rule. Good players will, however, frequently deviate from recognised play, and indulge in what I hope I may be permitted to call the common-sense of Whist.

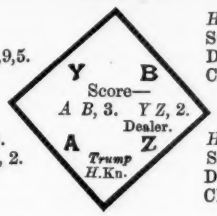
To illustrate the last observation I send you a game in which I played *A*. It will be observed that I had Ace to five and did not lead the Ace, and that I had five trumps and did not lead one. Both conditions were combined in my hand, which might have induced one set of players to lead a trump notwithstanding the Knave turned, and another set to lead the Ace of the suit. In my judgment either play, although in the direction of uniformity, would

have been bad Whist—taking the score into consideration. I refer you to the notes upon the game. FREDERIC H. LEWIS.

THE HANDS.

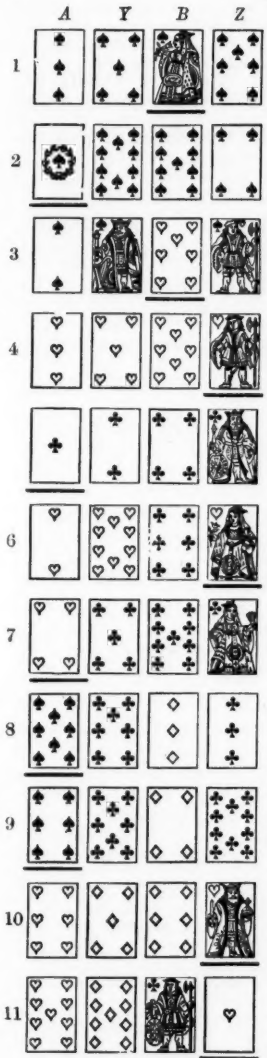
*Y.*
*Hearts*—10, 5.
Spades—K, 10, 5.
Diamonds—Kn,10,9,5.
Clubs—8, 7, 5, 2.

*B.*
*Hearts*—8, 7.
Spades—Q, 9.
Diamonds—K, 8, 6, 4, 3.
Clubs—Kn, 9, 6, 4.




*A.*
*Hearts*—9, 6, 4, 3, 2.
Spades—A, 8, 6, 3, 2.
Diamonds—7, 2.
Clubs—A.

*Z.*
*Hearts*—A, K, Q, Kn.
Spades—Kn, 7, 4.
Diamonds—A, Q.
Clubs—K, Q, 10, 3.




MR. LEWIS'S NOTES.

NOTE.—The card underlined wins the trick, and card below leads next round.

1. *A* treats the suit as if it were not headed by the Ace, and leads the penultimate. *Z*, with his grand hand, commences a signal.

2. *B*, who can open nothing to advantage, returns the suit in the hope of making a small trump. *Z* completes his signal.

3. *A* develops the penultimate upon the third round, leaving his partner to draw the proper inference.

4. The lead through the signal is here forced. *A* must have numerical strength in trumps to play as he did. *A* knows by the play of the Eight that *B* has no other trump. *A* echoes notwithstanding the weak lead of trumps and the signal.

5. *Z* clears his suit before continuing trumps. The game seems to him a certainty.

6. *A* leads a trump to draw two for one. *B* is in some difficulty about the discard as *Z* has declared strength in trumps, but prefers to discard a Club as *A* must have also numerical strength in trumps. *Z* by the fall of the cards can count three trumps and two Spades in *A*'s hand.

7. Trifling with the game. He should here have led the two best trumps, and leaving *A* with the long trump, then have played C Q, in which event he must have won the game.

8. *A* cannot risk playing another trump. If the trumps are both in *Z*'s hand, *A* can never get the lead again. He therefore proceeds with his Spade suit. *Y* discards a Club to inform his partner he has not the Knave. *Z* takes advantage of this information and refuses to trump, trying, though in vain, to recover his position.

9. *A* continues with the last spade, and as *Y* discards another Club, *Z* knows the position of the Knave, and discards C 10, hoping to tempt *A* to lead a Diamond.

10. *A*, of course, plays the losing trump and throws the lead into *Z*'s hand, and *B* makes his D K. *A* and *B* make two by cards and the game, a result which would have been absolutely impossible if either one or other of the conventional leads had been adopted. The game is another instance of what so frequently occurs at Whist,—that a player endeavours to make more tricks than are necessary to win the game.

## SIGNALS AT WHIST.

Is there not something antipodean in the question as to signalling in dispute between "Australia" and "Cavendish"? The former, apparently, would play *to win*, the latter certainly insists on the *mental exercise*. Accordingly, Australia would minimise, while Cavendish (to coin a word) maximises, the advantage given to quick observation, exact memory, and acute inference.

Given the original element of chance in the deal, the "signalling" system tends to make all the rest a trial of skill, and thus, surely, to add greatly to the interest of the game. In a game where nothing could be known (as in the imaginary case of $n$ hands played simultaneously, taking $n$ as the limit of memory) there could be no interest at all; the tricks might as well be thrown for on dice.

Q. T. V.

# Our Chess Column.

**BY MEPHISTO.**

*One Hundred Chess Problems.* By the Rev. A. CYRIL PEARSON, M.A. Third Edition. (Civil Service Printing Company.)

THIS little volume, neatly got up, contains "a selection from those problems" composed by the author "which have stood the test of publication." The only additions to the third edition are four problems. The first was a highly successful competitor in the late *Chess Monthly* Problem Tourney, it being pronounced by the judges to be the finest problem in this important competition. The problem ably exemplifies a fine piece of strategy, and will bear favourable comparison with the first masterpieces of the English school. It reminds one of those exquisite gems by Grimshaw, the theme, which is both piquant and original, being not very unlike the style of this English master. This problem and No. 91 in the first series are undoubtedly the two finest conceptions of the Rev. composer.

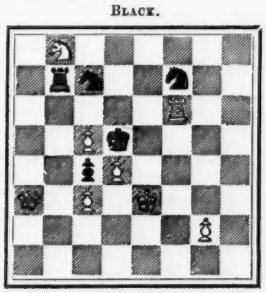
The second problem is a three-mover. It has a pretty idea, and is remarkable for a few close shaves to second solutions. The composition is rather barren for want of variety.

The third problem is a two-mover, the apparent novelty being that the White King moves from a position where he cannot be disturbed to a square where Black can administer six checks. So far the idea is good, but there being no ingenuity displayed in the method of averting the counter-checks and the number of inactive White pieces, I don't like it.

The fourth and last is a little amusing study after the American school; indeed, it can very appropriately be dubbed a Yankee trick. It is a sort of walking-up-stairs arrangement, perhaps intended as a classical illustration of a treadmill!

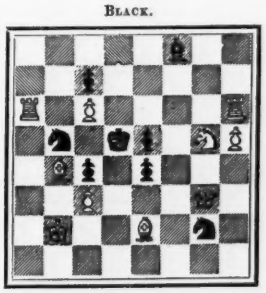
In the body of the work there are a few corrections made to the faulty positions which appeared in the first editions. Among the choicest of these are Nos. 33 and 49. No. 49 was a competitor in one of the "Westminster Papers" tourneys. No. 33 has a sweetly pretty conceit.

No. 33.
BLACK.



WHITE.
Mate in three.

No. 49.
BLACK.



WHITE.
Mate in three.

B. G. L.

## SOLUTION.

PROBLEM, No. 104, BY B. G. LAWS, p. 296.

| | |
|---|---|
| 1. Kt to Q5 | P tkes Kt, or 1 |
| 2. Q to KB6 | P to Q5 |
| 3. Q to Q6, mate | |
| If 2. K to K6 | |
| 3. Q to B4, mate | |

| | |
|---|---|
| 1. | K takes Kt |
| 2. P to K4 (ch) | B takes P |
| 3. B to Kt3, mate | |
| If 2. K takes P | |
| 3. B to B3, mate | |

If 1. B to Q6. 2. P takes B (ch), K takes Kt. 3. B to B3, mate. If any other move, 2. Kt to B6, mate.

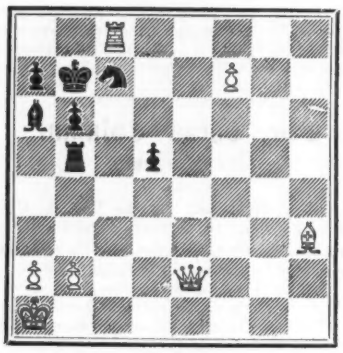
In reference to this problem, we have to acknowledge an error in

our answers to I. K. R., Berrow, and M. T. Hooton. If 1. P to K3, B to R2. 2. K to Kt4, B to Q6! Or if 1. Kt takes P, B to R2. 2. Q to B3 (ch), K to K4! and in neither case is there a mate on the move.

PROBLEM No. 105.

By J. W. Parsons.

Black.



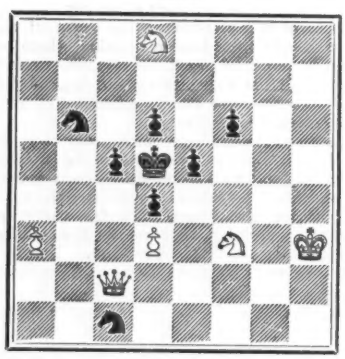
White.

White to play and mate in three moves.

PROBLEM No. 106.

By C. T. Gray.

Black.



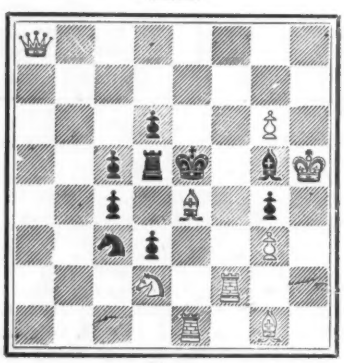
White.

White to play and mate in three moves.

PROBLEM No. 107.

By Frederick W. Markwick.

Black.



White.

White to play and mate in two moves.

## ANSWERS TO CORRESPONDENTS.

*** *Please addres Chess Editor.*

A. de Watteville.—You send the following position:—White.—K, K3; R, KB sq; Kt, KR8; Ps, QB3 and 4. Black.—K, K4; PK2. We assume you intend the White Pawns to be on QB4 and 5, as otherwise the K could escape by way of Q3. If then, 1. Kt to Kt6 (ch), K to K3. 2. Kt to B8 (ch), K to K4. Now for his waiting move in order to force Black to play P to K3. The White R has *four* moves, viz., to B2, B3, B4, and B7; or White can also play K to Q3 with the same object. Finally, in reply to P to K3, White can mate either by Kt to Q7 or Kt to Kt6. You have therefore five duals, a most serious objection to a problem.

Berrow.—We regret to find your other problem too easy.

F. W. M.—The solution of No. 1 is rather too obvious.

J. Hughes.—Both your problems are incorrect. One can be solved by Q to Kt4 (ch), the other by Kt to Kt4.

Tom.—No. 1. P takes R spoils the mate. No. 2. R takes B.

P. G. R.—W., M. T. Hooton, best thanks for correction.

G. Woodcock.—Regret the delay of your letter of 3rd inst. The five prize problems correctly solved. We shall be pleased to find you an opponent for correspondence games.

Problem 104 correctly solved by W., W. Furnival, G. Woodcock, Rev. W. Anderson, H. A. N.

H. S. Simon, B. Gleam.—Solutions incorrect.


## MR. R. A. PROCTOR'S COURSE OF LECTURES.

1. LIFE OF WORLDS.
2. THE SUN.
3. THE MOON.
4. THE PLANETS.
5. COMETS.
6. THE STAR DEPTHS.

*See Advt. Pages for full Syllabus.*

The following arrangements are complete: the numbers in brackets referring to above list.

Stockton, Nov. 26 (1).
Edinburgh, Nov. 28 (6).
Rothesay, Nov. 29 (1)
Morningside, Dec. 4 (4).
Falkirk, Dec. 5 (6).
Alexandria, Dec. 6.
Altrincham, Dec. 10 and March 11.
Carlisle, Nov. 27, 30; Dec. 3, 7 (1, 2, 3, 4).
Perry Bar, Jan. 29 (6).
King's Heath, Jan. 30 (1).
Colston Hall, Bristol, Feb. 18, 21, 25, 28; March 3, 6 (the full course).
Assembly Rooms, Cheltenham, Feb. 5, 8, 12, 15 (1, 2, 4, 6). At 3 o'clock, Feb. 5 and 12 (3, 5).
Assembly Rooms, Bath. Four Morning Lectures at 3 o'clock, Feb. 6, 9, 13, 16 (1, 3, 4, 6); two Evening, Feb. 6, 13 (2, 5).
Birkenhead, March 10.

NOTE.—*All communications respecting Lectures should be addressed to Mr. John Stuart, Royal Concert Hall, St. Leonards.*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